CLAIMS

1. A system for measuring a characteristic of an optical article, comprising:

a light source for producing light;

an optical element for focusing the light along a probe path to a reference location associated with an expected position of an optical article;

a sensor for detecting the light from the reference location, wherein the sensor generates signals associated with an intensity and position of the light received; and

a processor, wherein the processor is configured to receive the signals from the sensor and determine a deflection angle of the light from the probe path.

2. The system of claim 1, wherein the reference location is associated with an expected position of a surface of the optical article.

3. The system of claim 1, wherein the reference location is associated with an expected position of a volume of the optical article.

4. The system of claim 1, further including a stage for translating an optical article relative to the light source and the probe path in at least one dimension.

5. The system of claim 1, further including a stage for translating an optical article relative to the light source and the probe path in three dimensions.

6. The system of claim 1, wherein the processor is further configured to determine a characteristic of the optical article based on the deflection angle of the light at multiple locations of the optical article.

7. The system of claim 6, wherein the characteristic includes one or more of surface flatness, a divot feature, or a peak feature of the optical article.

8. The system of claim 6, wherein the characteristic includes an index of refraction value.

9. The system of claim 6, wherein the characteristic includes stored information.

10. The system of claim 1, wherein the sensor includes at least two segments and is configured to generate a signal associated with the intensity of light received at each of the at least two segments.

11. The system of claim 1, wherein the sensor includes a quadrant photodetector and is configured to generate a signal associated with the intensity of light received at each quadrant of the quadrant detector.

12. The system of claim 1, wherein the sensor includes a position sensitive diode device.

13. The system of claim 12, wherein the position sensitive diode device generates two signals, a first signal associated with a location of an intensity centroid along one direction and a second signal associated with a location of an intensity centroid along a second direction, the second direction orthogonal to the first direction.

14. The system of claim 1, further including a second optical element positioned to focus the light beam from the reference location to a pinhole filter between the second optical element and the sensor.

15. The system of claim 14, wherein the second optical element and pinhole filter are disposed in a confocal imaging configuration.

16. The system of claim 1, where the sensor is positioned to detect light passing through the reference location.

17. The system of claim 1, where the sensor is positioned to detect light reflected from the reference location.

18. A method for measuring a characteristic of an optical article, comprising:

illuminating an optical article with a focused beam of light along a probe path;

detecting the light with a sensor after the light interacts with the optical article;

determining a deflection angle of the beam of light with respect to the probe path after interacting with the optical article; and

determining a characteristic of the optical article based on the deflection angle.

19. The method of claim 18, further including scanning multiple positions of the optical article with the focused beam of light to determine deflection angles at multiple positions of the optical article.

20. The method of claim 19, further including using the multiple deflection angles to determine a characteristic of the optical article.

21. The method of claim 19, further including producing a surface relief pattern from the multiple deflection angles.

22. The method of claim 19, further including producing an equivalent single surface plot from the multiple deflection angles.

23. The method of claim 19, further including producing a volumetric index map.

24. The method of claim 19, further including confocally imaging the light after the light interacts with the optical article.

25. The method of claim 19, wherein the light is confocally filtered after the light interacts with the optical article.

26. A method for measuring a characteristic of an optical article, comprising:

scanning an optical article with a focused beam of light;

detecting a deflection angle of the focused beam of light from the optical article at multiple scan positions; and

determining a characteristic of the optical article based on the deflection angles at the multiple scan positions.

27. The method of claim 26, wherein the scan is performed along a first and second dimension, the first and second dimension orthogonal to the path of the focused beam of light.

28. The method of claim 26, wherein the scan is performed along a third dimension, the third dimension parallel to the path of the focused beam of light.

29. The method of claim 26, wherein the focused beam of light from the optical article passes through a confocal imaging system.

30. The method of claim 26, further including producing a surface relief pattern from the multiple deflection angles.

31. The method of claim 26, further including producing an equivalent single surface plot from the multiple deflection angles.

32. The method of claim 26, further including producing a volumetric index map.